Adopted by BOSC 2/06

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Grade Six

These guidelines have been designed to assist teachers to focus on what a typical child should know and be able to do at various times in sixth grade in order to master the sixth grade level expectations. The sixth grade mathematics program presents concepts that are introduced, developed or mastered. Problem solving and communication are expected to be incorporated throughout the curriculum.

First Semester

Numbers and Operations

- *Magnitude of Numbers M (N&O) 6-2*
- *Mathematical Operations M (N&O) 6-3* [Whole numbers and Decimals]
- *Solving Problems M (N&O) 6-4* [Order of Operations, Least Common Multiple, and Greatest Common Factor, Operations on Decimals]
- *Mental Math M (N&O) 6-6*
- *Estimation M (N&O) 6-7*
- Properties M (N&O) 6-8

Geometry and Measurement

- *Sorting and Classifying M (G&M) 6-1*
- *3-D Shapes M (G&M) 6-3*
- *Perimeter/ Area/Volume M (G&M) 6-6* [Perimeter/Circumference, Area]
- *Measurement M (G&M) 6-7* [Metric System, Elapsed Time]

Functions and Algebra

- *Patterns M (F&A) 6-1*
- *Rates of Change M (F&A) 6-2*
- *Algebraic Expressions M (F&A) 6-3*
- *Equality M (F&A) 6-4*

Data, Statistics and Probability

- *Interpret a Given Representation M (DSP) 6-1*
- *Analyze Data M (DSP) 6-2*
- *Organize and Display Data M (DSP) 6-3*
- *Counting Techniques M (DSP) 6-4*

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Grade Six
Second Semester

Numbers and Operations

- *Rational Numbers M (N&O) 6-1* [Ratios and Rates]
- *Mathematical Operations M (N&O) 6-3* [Fractions, Integers]
- *Solving Problems M (N&O) 6-4* [Operations on Fractions, Integers, Percent of a Whole]
- *Mental Math M (N&O) 6-6*
- *Estimation M (N&O) 6-7*
- *Properties M (N&O) 6-8*

Geometry and Measurement

- *Congruency M (G&M) 6-4*
- *Similarity M (G&M) 6-5*
- *Perimeter/ Area/Volume M (G&M) 6-6* [Volume]
- *Measurement M (G&M) 6-7* [Standard (Customary) System, Angle Measure]

Functions and Algebra

- *Patterns M (F&A) 6-1*
- *Rates of Change M (F&A) 6-2*
- *Algebraic Expressions M (F&A) 6-3*
- *Equality M (F&A) 6-4*

} Review from First Semester and Increase Depth of Knowledge

Data, Statistics and Probability

- *Interpret a Given Representation M (DSP) 6-1*
- *Analyze Data M (DSP) 6-2*
- *Organize and Display Data M (DSP) 6-3*

} Review from First Semester and Increase Depth of Knowledge

- *Probability M (DSP) 6-5*
- *Experimental Design M (DSP) 6-6*

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Grade Level Expectation	Content	Skills	Depth of Knowledge
M (N&O)-6-1 *Rational Numbers*	Ratios Rates	Demonstrate conceptual understanding of: ratios with three forms of notation (a/b, a:b, and a÷b where b≠0) rates (a out of b and as a percent - 1 out of 4 = 25%) Use models, explanations and other representations	1,2,
M (N&O)-6-2 *Magnitude of Numbers*	Whole number bases with whole number exponents Integers Rational numbers (fractions, decimals, percents 1%-100%)	Order and compare fractions, decimals, percents **within and across** number formats Order and compare numbers using exponents Order and compare quantities using number lines and equality and inequality symbols	2
M (N&O)-6-3 *Mathematical Operations*	Addition and subtraction of positive fractions and integers Multiplication and division of fractions and decimals Whole numbers with whole number exponents	Demonstrate conceptual understanding of math operations by describing or illustrating the relationship of a base and exponent Demonstrate conceptual understanding of the effect on the magnitude of a whole number when multiplied or divided by whole number, decimal, or fraction	2,3

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Grade Level Expectation	Content	Skills	Depth of Knowledge
M (N&O)-6-4 *Solving Problems*	Single or multiple operations on fractions (proper, improper and mixed) Single or multiple operations on decimals Addition and subtraction of integers Percent of a whole Greatest common factor (GCF) Least common multiple (LCM) Orders of operations (with and without parentheses)	Solve problems incorporating content as listed	1,2,3
M (N&O)-6-5 *Monetary Value*	None at this level	----	----
M (N&O)-6-6 *Mental Math* *Embed mental arithmetic throughout math instruction*	Mental computation strategies: Use compatible numbers Apply properties Use mental imagery Use patterns	Mentally calculate money change (expand to $20, $50 and $100) Multiply 2 digit by 1 digit whole numbers Multiply combinations of 2 and 3 digit numbers (multiples of 10, 100) Divide 3 or 4 digit multiples of powers of 10 by their compatible factors $(360 \div 6, 360 \div 60, 360 \div 12, 360 \div 120)$ Determine the part of a whole number using benchmark percents (1%, 10%, 25%, 50%, 75%)	Embedded

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Grade Level Expectation	Content	Skills	Depth of Knowledge
M (N&O)-6-7 *Estimation* *Embed estimation throughout math instruction*	Estimation	Identify when estimation is appropriate Select an appropriate method of estimation Determine the level of accuracy needed for a situation Analyze effect of estimate on accuracy of results Evaluate the reasonableness of solution	Embedded
M (N&O)-6-8 *Properties* *Embed properties throughout math instruction*	Number Properties Odd and even numbers, positive and negative numbers, prime factorization, divisibility and remainders Field Properties commutative, associative, identity, multiplicative, Property of 1, distributive, and additive inverse	Apply number properties to simplify computations and solve problems	Embedded
M (G&M)-6-1 *Sorting and Classifying*	Uses properties and attributes of : Angles (right, acute, obtuse) Sides (number of sides, congruent, parallelism, or perpendicularity)	Identify, describe, classify or distinguish among different types of triangles (acute, right, obtuse, scalene, isosceles, equiangular, and equilateral) Identify, describe, classify or distinguish among different types of quadrilaterals (squares, rectangles, rhombi, trapezoids, parallelograms)	1,2

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Grade Level Expectation	Content	Skills	Depth of Knowledge
M (G&M)-6-2 *Applies Theorems or Relationships*	None at this Grade	----	----
M (G&M)-6-3 *3-Dimensional Shapes*	Properties or attributes of shapes: Shape of bases, number of lateral faces, number of bases, number of edges, number of vertices 3-D shapes: rectangular prisms, triangular prisms, cylinders, spheres, pyramids, cones	Use properties or attributes to identify, compare or describe 3-D shapes	1,2
M (G&M)-6-4 *Congruency*	Transformations (reflections, translations, rotations) Congruency Line and rotational symmetry	Predict and describe transformational steps (reflection, translation, and rotation including degree of rotation) needed to show congruence Compose and decompose two- and three-dimensional objects using models or explanations Use line and rotational symmetry to demonstrate congruent parts within a shape	1,2
M (G&M)-6-5 *Similarity*	Similarity of polygons and circles	Describe the proportional effect on the linear dimensions of polygons or circles (when scaling up or down) while preserving the angle measures of polygons using models or explanations Apply scales to maps	1,2,3

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Grade Level Expectation	Content	Skills	Depth of Knowledge
M (G&M)-6-6 *Perimeter/Area/Volume*	Perimeter of polygons Area of quadrilaterals or triangles Volume of rectangular prisms Circumference of a circle (relationships of radius, diameter and circumference)	Determine perimeter/circumference, area, volume and circumference using formulas, models, or solving related problems Express measures in appropriate units.	1,2,3
M (G&M)-6-7 *Measurement* *Embed measurement throughout math instruction*	Length (inch, foot, centimeter, meter, yard, mile, kilometer, 12in=1ft, 100cm=1m, 3ft=1yd, 10mm=1cm, 1000mm=1m, to 1/16 inch, to 0.1 cm, to .001m,) Time (hour, day, year, 24hrs=1 day, 7 days=1 week, 365 days=1 year, 60 sec=1 min, 60min=1 hr, to 1 minute intervals) Temperature (Celsius and Farenheit to 1 degree) Capacity (quart, gallon, pint, liter 32oz=1qt, 4qts=1 gal., 2pts=1qt, 1000ml=1L, to 1oz) Mass (gram, kilogram) Weight (pound, ounces, 16oz=1lb., to 1oz) Angles and Rotation (degree, 360° = 1circle, 90° = right angle, to 2 degrees)	Measure using appropriate units for length, time, temperature, capacity, mass and weight Solve problems and make conversions for length, time and mass Metric System – Decimals – Semester I Standard (Customary) System – Fractions – Semester II	Embedded
M (G&M)-6-8 *Time*	None at this level	----	----

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Grade Level Expectation	Content	Skills	Depth of Knowledge
M (G&M)-6-9 *Spatial Relationships*	None at this level	----	----
M (G&M)-6-10 *Spatial Reasoning and Visualization*	None at this level	----	----
M (F&A)-6-1 *Patterns*	Identifies and extends to specific cases a variety of patterns (linear and nonlinear) represented in models, tables sequences, graphs, or problem situations	Write a rule in words or symbols to determine any specific element in a linear or nonlinear relationship Write an expression or equation using words or symbols to express the generalization of a linear relationship (twice the term number plus one, 2n+1)	2,3
M (F&A)-6-2 *Rates of Change*	Linear relationships (y=kx and y=mx+b) as a constant rate of change	Construct and interpret graphs of real occurrences Describe slope of linear relationships (faster, slower, greater, smaller) in problem situations Describe how a change in one variable relates to a change in the value of the second variable in problem situations with constant rates of change	1,2

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Grade Level Expectation	Content	Skills	Depth of Knowledge
M (F&A)-6-3 *Algebraic Expressions*	Algebraic expressions including more than 1 variable	Write linear algebraic expressions using order of operations Evaluate linear algebraic expressions (including more than one variable) Evaluate an expression within an equation (find y when $x = 4$, given $y=3x-2$)	1,2
M (F&A)-6-4 *Equality*	Equality	Show equivalence between two expressions using models or different representations Solve multi-step linear equations of the form $ax \pm b=c$ where a, b, and c are whole numbers and $a \neq 0$	1,2
M (DSP)-6-1 *Interpret a Given Representation* *Consistent with skills in M (DSP)-6-2*	Data interpretation Data representations: Circle graphs, Line graphs, Stem-and-leaf plots	Answer questions related to data Analyze data to: formulate or justify conclusions make predictions solve problems	1,2,3
M (DSP)-6-2 *Analyze Data*	Patterns, trends and distributions in data	Analyze patterns, trends or distributions in data using measures of central tendency (median, mean, mode) and dispersion (range) to analyze situations and solve problems	2,3

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Grade Level Expectation	Content	Skills	Depth of Knowledge
M (DSP)-6-3 *Organize and Display Data* *Consistent with skills in M (DSP)-6-2*	Data representations: Tables Line graphs Stem-and-leaf plots	Answer questions related to the data Analyze data to formulate or justify conclusions, make predictions and solve problems	2,3
M (DSP)-6-4 *Counting Techniques*	Strategies: organized lists, tables, tree diagrams, models, Fundamental Counting Principle	Utilize counting techniques to solve combination and simple permutation problems in context	2,3
M (DSP)-6-5 *Probability*	Experimental and theoretical probability	Predict the theoretical probability of an event Test predictions through experiments and simulations Design fair games Determine the theoretical or experimental probability of an event in a problem solving situation	1,2,3
M (DSP)-6-6 *Experimental Design* *Consistent with skills in M (DSP)-6-2*	Independent experimental design (In response to a teacher or student generated question or hypothesis)	Determine most effective method of data collection (survey, observation, experimentation) Collect, organize and display data Analyze data to draw conclusions and make predictions about question or hypothesis being tested Ask new question based on results Make connections to real world situations	2,3

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Grade Seven

These guidelines have been designed to assist teachers to focus on what a typical child should know and be able to do at various times in seventh grade in order to master the seventh grade level expectations. The seventh grade mathematics program presents concepts that are introduced, developed or mastered. Problem solving and communication are expected to be incorporated throughout the curriculum.

First Semester

Numbers and Operations

- *Rational Numbers M (N&O) 7-1* [Percents, Models, Proportions]
- *Magnitude of Numbers M (N&O) 7-2*
- *Mathematical Operations M (N&O) 7-3*
- *Solving Problems M (N&O) 7-4* [Add/Subtract Integers, Exponents, Order of Operations, Proportional Reasoning]
- *Mental Math M (N&O) 7-6*
- *Estimation M (N&O) 7-7*
- *Properties M (N&O) 7-8*

Geometry and Measurement

- *Sorting and Classifying M (G&M) 7-1*
- *Apply Theorems and Relationships M(G&M) 7-2*
- *Congruency M (G&M) 7-4* [Coordinate Plane]
- *Similarity M (G&M) 7-5* [Areas of Similar Polygons and Circles]
- *Perimeter/ Area/Volume M (G&M) 7-6* [Perimeter/Circumference, Area]
- *Measurement M (G&M) 7-7*

Functions and Algebra

- *Patterns M (F&A) 7-1*
- *Rates of Change M (F&A) 7-2* [Slope: Meaning, Table/Graph, Constant Rate of Change]
- *Algebraic Expressions M (F&A) 7-3*

Data, Statistics and Probability

- *Interpret a Given Representation M (DSP) 7-1*
- *Analyze Data M (DSP) 7-2, Organize and Display Data M (DSP) 7-3*
- *Counting Techniques M (DSP) 7-4*

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Grade Seven

Second Semester

Numbers and Operations

- *Rational Numbers M (N&O) 7-1* [Square Roots, Proportions, Ratios, Rates]
- *Magnitude of Numbers M (N&O) 7-2* } Review from First Semester and Increase Depth of Knowledge
- *Solving Problems M (N&O) 7-4* [Square Roots, Percents]
- *Mental Math M (N&O) 7-6*
- *Estimation M (N&O) 7-7*
- *Properties M (N&O) 7-8*

Geometry and Measurement

- *Congruency M (G&M) 7-4* [Transformations]
- *Similarity M (G&M) 7-5* [Similarity of Polygons and Circles]
- *Perimeter/ Area/Volume M (G&M) 7-6* [Surface Area, Volume]
- *Measurement M (G&M) 7-7*
- *Spatial Reasoning and Visualization M (G&M) 7-10*

Functions and Algebra

- *Rates of Change M (F&A) 7-2* [Slope, Solve Problems, Change in Value]
- *Algebraic Expressions M (F&A) 7-3*
- *Equality M (F&A) 7-4*

Data, Statistics and Probability

- *Interpret a Given Representation M (DSP) 7-1*
- *Analyze Data M (DSP)7-2*
- *Organize and Display Data M (DSP)7-3*
- *Counting Techniques M (DSP) 7-4*

} Review from First Semester and Increase Depth of Knowledge

- *Probability M (DSP) 7-5*
- *Experimental Design M (DSP) 7-6*

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Grade Level Expectations	Content	Skills	Depth of Knowledge
M (N&O)-7-1 *Rational Numbers*	Square roots of perfect squares Rates Proportional Reasoning Percents	Compare percents of a whole when the wholes vary in magnitude Utilize models, explanations and other representations Demonstrate conceptual understanding of: ▪ square roots of perfect squares ▪ the use of proportional reasoning as it relates to ratios, rates and percents ▪ percents as a way of expressing multiples of a number (200% of 50)	1,2
M (N&O)-7-2 *Magnitude of Numbers*	Whole number bases with whole number exponents Integers Rational numbers (fractions, decimals, percents) Absolute value Scientific notation	Order, compare, and identify equivalent rational numbers (fractions, decimals, percents)across number formats. Connect numbers to quantities using number lines or equality and inequality symbols	2
M (N&O)-7-3 *Mathematical Operations*	Whole numbers with whole number exponents Integers	Describe or illustrate using models, diagrams, or explanations	
M (N&O)-7-4 *Solving Problems*	Addition and subtraction of integers Numbers raised to whole number powers Square roots of perfect square and non-perfect square numbers Order of operations using parentheses, brackets and exponents Proportional Reasoning Percents involving discounts, tax or tips, and rates	Solve problems incorporating content as listed	1,2,3

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Grade Level Expectations	Content	Skills	Depth of Knowledge
M (N&O)-7-5 *Monetary Value*	None at this level	----	----
M (N&O)-7-6 *Mental Math* *Embed mental arithmetic throughout math instruction*	Mental computation strategies: Use compatible numbers Apply properties Use mental imagery Use patterns	Mentally calculate benchmark perfect squares and square roots (1^2, 2^2,…, 12^2, 15^2, 20^2, 100^2, 1000^2) Determine part of a number using benchmark percents and related fractions (1%, 10%, 25%, $33\frac{1}{3}$%, 50%, $66\frac{2}{3}$%, 75%, 100%) ex. $33\frac{1}{3}$% of 21 and 25% of 16	Embedded
M (N&O)-7-7 *Estimation* *Embed estimation throughout math instruction*	Estimation Tips, discounts and taxes	Identify when estimation is appropriate Select an appropriate method of estimation Determine the level of accuracy needed for a situation Analyze effect of estimate on accuracy of results Evaluate the reasonableness of solution	Embedded

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Grade Level Expectations	Content	Skills	Depth of Knowledge
M (N&O)-7-8 *Properties* *Embed properties throughout math instruction*	Number Properties: Odd and even numbers, positive and negative numbers, prime factorization, divisibility and remainders Field properties: commutative, associative, identity (including $2^0 \times 2^3 = 2^{0+3} = 2^3$), distributive, inverses (additive and multiplicative)	Apply number properties to simplify computations and solve problems with remainders Demonstrate conceptual understanding of field properties as they apply to subsets of the real numbers (ex. Set of whole numbers does not have additive inverse, set of integers does not have multiplicative inverse)	Embedded
M (G&M)-7-1 *Sorting and Classifying*	Adjacent angles, vertical angles, straight angles, and angle relationships formed by parallel and nonparallel lines cut by a transversal	Use properties and attributes of angle relationships resulting from two or three intersecting lines	1,2
M (G&M)-7-2 *Applies Theorems or Relationships*	Sums of interior angles of regular polygons Triangle Inequality	Solve problems using sums of interior angles of regular polygons	1,2
M (G&M)-7-3 *3-Dimensional Shapes*	None at this level	----	----
M (G&M)-7-4 *Congruency*	Congruency on the coordinate plane Transformations	Solve problems of congruency on the coordinate plane involving reflections, translations and rotations	1,2
M (G&M)-7-5 *Similarity*	Similarity of polygons and circles Areas of similar polygons and circles	Solve problems and determine the effect of scaling (up or down) and the impact on angle measures, linear dimensions and areas of polygons, and circles when the linear dimensions are multiplied by a constant factor Describe effects using models or explanations	1,2,3

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Grade Level Expectations	Content	Skills	Depth of Knowledge
M (G&M)-7-6 *Perimeter/Area/Volume*	Area of a circle Area and perimeter/circumference of composite figures (quadrilaterals, triangles, parts of circles) Surface area of rectangular prisms Volume of triangular prisms, rectangular prisms, and cylinders	Determine perimeter/circumference, area and volume using formulas, models or by solving related problems Express measures in appropriate units	1,2,3
M (G&M)-7-7 *Measurement* *Embed measurement throughout math instruction*	Length (inch, foot, centimeter, meter, yard, mile, kilometer, 12in=1ft, 100cm=1m, 3ft=1yd, 10mm=1cm, 1000mm=1m, to 1/16 inch, to 0.1 cm, to .001m,) Time (hour, day, year, 24hrs=1 day, 7 days=1 week, 365 days=1 year, 60 sec=1 min, 60min=1 hr, to 1 minute intervals) Temperature (Celsius and Farenheit to 1 degree) Capacity (quart, gallon, pint, liter 32oz=1qt, 4qts=1 gal., 2pts=1qt, 1000ml=1L, to 1oz) Mass (gram, kilogram) Weight (pound, ounces, 16oz=1lb., to 1oz) Angles and Rotation (degree, 360° = 1circle, 90° = right angle, to 2 degrees)	Measure using appropriate units for length, time, temperature, capacity, mass and weight Solve problems and make conversions for length, time and mass	Embedded

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Grade Level Expectations	Content	Skills	Depth of Knowledge
M (G&M)-7-8 *Time*	None at this level	----	----
M (G&M)-7-9 *Spatial Relationships*	None at this level	----	----
M (G&M)-7-10 *Spatial Reasoning and Visualization* *Consistent with skills in M (G&M) –7-6*	3-D solids Nets Surface Area	Sketch 3-D solids Draw nets of rectangular and triangular prisms, cylinders and pyramids Use nets to find surface area	
M (F&A)-7-1 *Patterns*	Identify and extend to specific cases a variety of patterns (linear and nonlinear) represented in models, tables, sequences, graphs, or problem situations	Generalize a linear relationship using words and symbols for a specific case Write an expression or equation using words or symbols to express the generalization of a nonlinear relationship	2,3
M (F&A)-7-2 *Rates of Change*	Linear relationships (y=kx and y=mx+b) as a constant rate of change	Solve problems involving relationship of slope and rate of change Describe the meaning of slope in concrete situations Determine the slope of a line from a table or graph Distinguish between constant and various rates of change in relation to tables and graphs Describe how a change in the value of one variable relates to a change in the value of the second variable in problem situations with constant rates of change	1,2,3

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Grade Level Expectations	Content	Skills	Depth of Knowledge
M (F&A)-7-3 *Algebraic Expressions*	Algebraic expressions (including those with whole number exponents or more than one variable)	Use letters to represent unknown quantities to write linear algebraic expressions Evaluate algebraic expressions within an equation (find y when $x = 4$, given $y = 5x^3 - 2$	1,2
M (F&A)-7-4 *Equality*	Equality	Show equivalence between two expressions using models or different representations Solve multi-step linear equations of the form $ax \pm b = c$, $ax \pm b = cx \pm d$, and $(x/a) \pm b = c$ where a,b,c are whole numbers, $a \neq 0$ and $c \neq 0$. Translate problem-solving situations into an equation	1,2
M (DSP)-7-1 *Interpret a Given Representation* *Consistent with skills in M (DSP)- 7-2*	Data interpretation Data representations: Circle graphs Scatter plots (discrete linear relationships) Histograms	Analyze data to: formulate or justify conclusions make predictions solve problems	1,2,3

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Grade Level Expectations	Content	Skills	Depth of Knowledge
M (DSP)-7-2 *Analyze Data*	Patterns, trends or distributions in data Outliers Bias	Analyze patterns, trends and distributions in data using measures of central tendency (median, mean, mode), dispersion (range or variation), or outliers to analyze situations to determine their effect on mean, median, mode Evaluate the sample from which the statistics were developed (bias)	2,3
M (DSP)-7-3 *Organize and Display Data* *Consistent with skills in M (DSP)-7-2*	Data representations: Tables Line graphs Scatter plots Circle graphs	Identify the best representation for data Organize and display data Answer questions related to the data Analyze data to form and justify conclusions, make predictions and solve problems Analyze data using measures of central tendency	2,3
M (DSP)-7-4 *Counting Techniques*	Strategies: organized lists, tables, tree diagrams, models, Fundamental Counting Principle	Utilize counting techniques to solve combination and permutation problems in context	N/A
M (DSP)-7-5 *Probability*	Experimental and theoretical probability	Predict the theoretical probability of an event Test predictions through experiments and simulations Compare and contrast theoretical and experimental probability Determine the theoretical or experimental probability of an event in a problem solving situation	1,2,3

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Grade Level Expectations	Content	Skills	Depth of Knowledge
M (DSP)-7-6 *Experimental Design* *Consistent with skills in* *M (DSP)- 7-2*	Independent experimental design (In response to a teacher or student generated question or hypothesis)	Determine most effective method of data collection (survey, observation, experimentation) Collect, organize and display data Analyze data to draw conclusions and make predictions about question or hypothesis being tested Analyze the data considering limitations that could affect interpretations Ask new question based on results Make connections to real world situations	2,3

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Grade Eight

These guidelines have been designed to assist teachers to focus on what a typical child should know and be able to do at various times in eighth grade in order to master the eighth grade level expectations. The eighth grade mathematics program presents concepts that are introduced, developed or mastered. Problem solving and communication are expected to be incorporated throughout the curriculum.

First Semester

Numbers and Operations

- *Rational Numbers M (N&O) 8-1* [Absolute Value, Radicals, Percent]
- *Magnitude of Numbers M (N&O) 8-2*
- *Solving Problems M (N&O) 8-4* [Radicals, Order of Operations, Multiply/Divide Integers]
- *Mental Math M (N&O) 8-6*
- *Estimation M (N&O) 8-7*
- *Properties M (N&O) 8-8*

Geometry and Measurement

- *Perimeter/Area/Volume M (G&M) 8-6*
- *Measurement M (G&M) 8-7*

Functions and Algebra

- *Patterns M (F&A) 8-1*
- *Rates of Change M (F&A) 8-2* [Slope, Intercepts, Constant and Varying Rates of Change]
- *Algebraic Expressions M (F&A) 8-3*

Data, Statistics and Probability

- *Interpret a Given Representation M (DSP) 8-1*
- *Analyze Data M (DSP) 8-2*
- *Organize and Display Data M (DSP) 8-3*
- *Counting Techniques M (DSP) 8-4*

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Grade Eight
Second Semester

Numbers and Operations

- *Rational Numbers M (N&O) 8-1* [Percent of Change, Increase/Decrease]
- *Solving Problems M (N&O) 8-4* [Proportional Reasoning, Percent Increase/Decrease, Interest Rates]
- *Mental Math M (N&O) 8-6*
- *Estimation M (N&O) 8-7*
- *Properties M (N&O) 8-8*

Geometry and Measurement

- *Apply Theorems or Relationships M (G&M) 8-2*
- *Similarity M (G&M) 8-5*
- *Measurement M (G&M) 8-7*

Functions and Algebra

- *Rates of Change M (F&A) 8-2* [Slope, Solve Problems, Change in Value]
- *Equality M (F&A) 8-4*

Data, Statistics and Probability

- *Interpret a Given Representation M (DSP) 8-1*
- *Analyze Data M (DSP) 8-2*
- *Organize and Display Data M (DSP) 8-3*
- *Counting Techniques M (DSP) 8-4*

} Review from First Semester and Increase Depth of Knowledge

- *Probability M (DSP) 8-5*
- *Experimental Design M (DSP) 8-6*

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Grade Level Expectation	Content	Skills	Depth of Knowledge
M (N&O)-8-1 *Rational Numbers*	Absolute value Perfect square and cube roots Percent of change (increase and decrease)	Demonstrate conceptual understanding of absolute value Describe change in terms of percent increase and decrease using explanation, models and other representations Recognize perfect squares and cube roots	N/A
M (N&O)-8-2 *Magnitude in Numbers*	Rational numbers (fractions, decimals, percents) Common irrational numbers (ex. Pi, $\sqrt{2}$) Whole number and fractional bases with whole number exponents (3^2, $\left(\frac{1}{5}\right)^2$) Square roots Absolute values Integers Scientific notation	Order and compare across number formats Connect numbers to quantities using number lines and equality or inequality symbols	N/A
M (N&O)-8-3 *Mathematical Operations*	None at this grade	----	----

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Grade Level Expectation	Content	Skills	Depth of Knowledge
M (N&O)-8-4 *Solving Problems*	Proportional reasoning Percent increase or decrease Interest rates Mark ups or rates Squares and cubes and taking square and cube roots Order of operations (parentheses, brackets, exponents) Multiplication or division of integers	Solve problems incorporating content as listed	N/A
M (N&O)-8-5 *Monetary Value*	None at this level	----	----
M (N&O)-8-6 *Mental Math* *Embed mental arithmetic throughout math instruction*	Mental computation strategies: Use compatible numbers Apply properties Use mental imagery Use patterns	Mentally calculate benchmark perfect squares and related square roots (1^2, 2^2…12^2-15^2, 20^2, 25^2, 100^2, 1000^2) Determine part of a number using benchmark percents and related fractions (1%, 10%, 25%, $33\frac{1}{3}$%, 50%, $66\frac{2}{3}$%, 75%, 100%) ex. $33\frac{1}{3}$% of 21, 25% of 16	N/A

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Grade Level Expectation	Content	Skills	Depth of Knowledge
M (N&O)-8-7 *Estimation* *Embed estimation throughout math instruction*	Estimation Tips, discounts and tax Non-perfect square roots between two whole numbers	Identify when estimation is appropriate Select an appropriate method of estimation Determine the level of accuracy needed for a situation Analyze effect of estimate on accuracy of results Evaluate the reasonableness of solution	N/A
M (N&O)-8-8 *Properties* *Embed properties throughout math instruction*	Number Properties: Odd and even numbers, positive and negative numbers, prime factorization, divisibility and remainders Field properties: commutative, associative, identity (including $2^0 \times 2^3 = 2^{0+3} = 2^3$), inverses	Apply number properties to simplify computations and solve problems Demonstrate conceptual understanding of field properties as they apply to subsets of real numbers when addition and multiplication are not defined in the traditional ways (e.g., if a Δ b= a+b-1, is Δ a commutative operation?)	N/A
M (G&M)-8-1 *Sorting and Classifying*	None at this grade	----	----
M (G&M)-8-2 *Applies Theorems or Relationships*	Pythagorean Theorem	Find missing side of a right triangle using Pythagorean Theorem Solve problems using Pythagorean Theorem	N/A
M (G&M)-8-3 *3-Dimensional Shapes*	None at this level	----	----
M (G&M)-8-4 *Congruency*	None at this level	----	----

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Grade Level Expectation	Content	Skills	Depth of Knowledge
M (G&M)-8-5 *Similarity*	Volume, surface area of 3-D figures Similarity of triangles Growth and rate problems	Determine the impact of scaling on volume and surface area of 3-D figures when line dimensions are multiplied by a constant factor Determine the length of sides of similar triangles Solve problems involving growth and rate	N/A
M (G&M)-8-6 *Volume and surface area*	Volume and surface area of rectangular prisms, triangular prisms, cylinders, pyramids and cones	Determine the volume and surface area using formulas, models, or by solving related problems Express measures in appropriate units	N/A
M (G&M)-8-7 *Measurement* *Embed measurement throughout math instruction*	Length (inch, foot, centimeter, meter, yard, mile, kilometer, 12in=1ft, 100cm=1m, 3ft=1yd, 10mm=1cm, 1000mm=1m, to 1/16 inch, to 0.1 cm, to .001m,) Time (hour, day, year, 24hrs=1 day, 7 days=1 week, 365 days=1 year, 60 sec=1 min, 60min=1 hr, to 1 minute intervals) Temperature (Celsius and Farenheit to 1 degree) Capacity (quart, gallon, pint, liter, 32oz=1qt, 4qts=1 gal., 2pts=1qt, 1000ml=1L, to 1oz) Mass (gram, kilogram) Weight (pound, ounces, 16oz=1lb., to 1oz) Angles and Rotation (degree, 360° = 1circle, 90° = right angle, to 2 degrees)	Measure using appropriate units for length, time, temperature, capacity, mass and weight Solve problems and make conversions for length, time and mass	Embedded

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Grade Level Expectation	Content	Skills	Depth of Knowledge
M (G&M)-8-8 *Time*	None at this level	----	----
M (G&M)-8-9 *Spatial Relationships*	None at this level	----	----
M (G&M)-8-10 *Spatial Reasoning and Visualization*	None at this level	----	----
M (F&A)-8-1 *Patterns*	Identifies and extends to a variety of patterns (linear and non-linear) represented in models, tables, sequences, graphs and problem situations	Generalize linear and common nonlinear relationships (nonrecursive explicit equation) to find a specific case Generalize a nonlinear relationship using words or symbols	N/A

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Grade Level Expectation	Content	Skills	Depth of Knowledge
M (F&A)-8-2 *Rates of Change*	Linear relationships (y=kx and y=mx+b) as a constant rate of change	Solve problems involving relationship of slope and rate of change Determine slopes and intercepts represented in graphs, tables, or problem situations Describe the meaning of slope and intercept in context Distinguish between linear relationships (constant rates of change) and nonlinear relationships (varying rates of change) represented in tables, graphs, equations, or problem situations Describe how a change in the value of one variable relates to a change in the value of the second variable in problem situations with constant and varying rates of change	N/A
M (F&A)-8-3 *Algebraic Expressions*	Algebraic expressions (including those with square roots, exponents, or rational numbers)	Simplify algebraic expressions Evaluate an expression within an equation (find y when x=4, given $y = 7\sqrt{x} + 2x$)	N/A

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Grade Level Expectation	Content	Skills	Depth of Knowledge
M (F&A)-8-4 *Equality*	Equality	Show equivalence between two expressions using models or different representations Solve formulas for a variable requiring one transformation ($d = rt; d / r = t$) Solve multi-step linear equations with integer coefficients Apply field properties, order of operations, or substitution to show whether two expressions are equivalent Informally solve problems involving systems of linear equations in context	N/A
M (DSP)-8-1 *Interpret a Given Representation* *Consistent with skills in M(DSP)-8-2*	Data interpretation Data representations: Line graphs Scatter plots (discrete linear relationships) Histograms Box-and-whisker plots	Analyze data to: formulate or justify conclusions make predictions solve problems	N/A

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Grade Level Expectation	Content	Skills	Depth of Knowledge
M (DSP)-8-2 *Analyze Data*	Patterns, trends or distributions in data Quartile values Estimated line of best fit	Analyze patterns, trends or distributions in data using measures of central tendency (median, mean, mode), dispersion (range or variation), outliers, quartile values or estimated line of best fit to analyze situations or solve problems Evaluate the sample from which the statistics were developed (biased, random or non-random)	N/A
M (DSP)-8-3 *Organize and Display Data* *Consistent with skills in M(DSP)-8-2*	Data representation: Scatter plots	Identify the best representation for data Organize and display data Answer questions related to the data Analyze data to form and justify conclusions, make predictions and solve problems Analyze data using measures of central Tendency	N/A
M (DSP)-8-4 *Counting Techniques*	Strategies: organized lists, tables, tree diagrams, models, Fundamental Counting Principle	Utilize counting techniques to solve combination and permutation (ordering) problems in context	N/A

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Grade Level Expectation	Content	Skills	Depth of Knowledge
M (DSP)-8-5 *Probability*	Experimental and theoretical probability	Predict the theoretical probability of a situation Test predictions through experiments and simulations Compare and contrast theoretical and experimental probability Determine the probability (theoretical or experimental) of an event in a problem solving situation	N/A
M (DSP)-8-6 *Experimental Design* *Consistent with skills in M(DSP)-8-2*	Independent experimental design (In response to a teacher or student generated question or hypothesis)	Determine most effective method of data collection (survey, observation, experimentation) Collect, organize and display data Analyze data to draw conclusions and make predictions about question or hypothesis being tested Analyze the data considering limitations that could affect interpretation Ask new question based on results Make connections to real world situations	N/A

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